STATEMENT OF ENGINEERING SERVICES AND SPECIFICATIONS

FOR RENOVATION OF COMPUTER ROOM (2S645)

[redacted] STATINTL

Approved For Release 2001/07/16 : CIA-RDP78-05732A000100020002-1

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ENGINEERING SERVICES

FOR RENOVATION OF COMPUTER ROOM (2S645) [redacted]

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GENERAL REQUIREMENTS

A. Basic Design Services.

1. Field Investigations - Make field investigations to determine the most suitable location for the chilled water piping. Chilled water supply and return piping will be connected to existing piping located in [redacted] near the common wall between STATINTL STATINTL [redacted]

2. Design Analysis - Prepare a design analysis showing all required mechanical and electrical calculations for sizing piping, ducts, air handling equipment, etc.

3. Drawings - Prepare detailed working drawings at 1/8 inch scale for the mechanical and electrical elements of the work which will show existing work to remain, new work to be installed, floor plans, equipment locations, piping layouts, sized ductwork layout (one line diagram), control diagrams, lighting and power layouts, wiring diagrams, sections and details (3/4 inch scale), equipment schedules, material specifications, and other appropriate data such that the scope of the construction work is clearly indicated.

a. A composite coordination drawing shall be prepared with the lighting layout, return air grille layout, sprinkler head layout, smoke detector layout, [redacted] and ceiling panel layout (laid off from center of room) all shown on a single tracing.

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b. Equipment and materials indicated on the drawings will be described by catalog cuts. Equipment specifications including capacities shall be specified on the drawings, however, trade names, model numbers, etc. shall not be used.

c. Drawings shall indicate by symbol, notation or legend existing work to be removed, existing work to remain, new work to be installed, names of spaces, dimensions, door swings, etc.

d. Mechanical drawings shall show ductwork and piping layouts to scale with sizes, necessary explanatory details, dampers, diffuser locations and capacities, equipment locations, relative to structural components of the building.

e. Electrical drawings shall show the lighting, switching, power and conduit layouts with capacities where applicable. Show details of panels and schedule for panels.

f. Provide five (5) sets of the completed drawings and design analysis for review and approval by the Agency. Revisions will be made as necessary and the original tracings will be furnished to the Agency for transmittal to GSA for reproductions and procurement of bids.

g. The drawings will be prepared without title boxes.

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4. Guide Specifications - Following is a list of G. S. A. guide specifications for reference. Delete any specified information that is not applicable and/or revise information to suit.

a. PBS-4-1605 - Electrical System, Amendment No. 1 - dated Feb. 1970.

b. 305-1A - Lighting Fixtures, Amendment No. 2 - dated Sept. 1968.

c. 302-8 - Fire Alarm System (coded) - dated March 1964.

d. 302-11 - Fire Alarm System (non-coded) - dated Feb. 1964.

e. PBS-4-1501 - M. & E. Equipment General Requirements - dated June 1970.

B. Schedule of Completion.

The project drawings and design analysis will be 100% completed and submitted to the Agency for review within fourteen (14) calendar days after notice to proceed.

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MECHANICAL REQUIREMENTS

A. Air Conditioning.

1. Optional Designs - Several possible alternatives exist for providing year round air conditioning (70°F DB ad 50% R. H.) to the Computer Room. Designs and cost estimates shall be prepared for each of the following alternatives:

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Alternative #1. Using the existing #2E air conditioning unit located in [redacted] as the sole source of cooling and humidity control for the Computer Room. Include the cost of supply and return duct modifications which are required for proper air distribution and temperature control. Also, include the cost of control modifications to the #2E system which may be required.

Alternative #2. Using air handling units within the Computer Room as the sole source of cooling and humidity control. (Note - this approach shall include supply and return connections to the existing #3 house air conditioning system for ventilation air (approximately 900 CFM). The design and cost of the required air distribution system shall be included.) Designs and cost estimates shall be prepared for the following two options:

Option a. Using only the existing (10 available ) 5 ton Liskey air handling units for cooling and humidity control. The cost of the following items shall be included:

- Reconditioning the four Liskey units which have been in service since 1969. The temperature and humidity controls on these four units shall be recalibrated by the manufacturer.
- Adding automatic flow control valves, globe and gate valves, strainers, thermometers, piping and fittings such that each air handler will conform to the GSA standard detail for water coil connections. (Fig. A)
- All branch piping and insulation required for the installation of the Liskey units.
- Sheet metal deflectors that may be required under the Liskey units for proper air distribution.
- All electrical switch gear that must be added including emergency shut down relays.
- Smoke detectors that are required under each air handling unit.

Option b. Using new state-of-the-art 20 ton air handling units for cooling and humidity control. These units shall be supplied with the following features:

General - The Computer Room air conditioning equipment shall be of the packaged type specifically designed to combat the high sensible heat loads generated by the computers and capable of controlling temperature and humidity as specified. Units shall be designed for the return air to

enter through the top filter compartment, be processed inside the unit, and discharged into a raised floor plenum. All piping and electrical connections shall be made through the bottom of the unit. The basic design shall include the following principle components: Air Filters (pre-filter and deep bed), 6-row chilled water coil, proportional controlled motor actuated 3-way valve, electric reheats, humidifier, electric temperature and humidity control system, centrifugal type evaporator blowers with motor and drive, and GSA Specification piping with automatic flow control valve.

Capacity - The units shall have a total cooling capacity of 285,000 Btuh and a sensible cooling capacity of 236,000 Btuh minimum when operating with return air conditions of 75° FDB and 50% RH.

The unit shall have a minimum reheat capacity of 72,000 Btuh in two (2) equal stages and a minimum humidification capacity of 26 lbs. water/hour.

The unit shall deliver air into the raised floor at a rate of 10,000 cfm against an external static pressure of 0.5 inches wg.

Controls and Indicators - Primary control of temperatue shall be made by means of a proportional thermostat located in the return air section of the unit. The thermostat shall sense temperature changes and signal the proportional actuating motor which in turn shall actuate the 3-way chilled

water valve. An end switch cam-operated assembly attached to the proportional motor shall control the heat stages for the heat function and also indicator lights as applicable.

Humidity control shall be accomplished by three humidistats electrically interlocked with the temperature control system. The "Low Humidity" instrument shall turn on the humidifier when needed and the "High Humidity" instruments shall energize the heating in two stages when dehumidification is needed. Humidification and dehumidification controls shall not signal their respective functions simultaneously. The dehumidification controls shall not signal the heat stages if more than 2/3 of the cooling capacity is functioning. The proportional thermostat, the three humidistats and a device for indicating when the filters have become clogged shall be located within the unit in such a position to sense the return air and to be convenient for the operator.

Located in the front access door, the indicator light panel shall provide indicators of all major functions of the unit and symptoms of possible trouble. The indicator lights shall be of the low voltage type and shall have long life expectancy (25,000 hours minimum). The indicator light panel shall indicate the following functions: POWER ON, SYSTEM ON, COOLING, REHEAT, HUMIDIFICATION, CLOGGED FILTER.

One single ON-OFF lighted push button switch shall be provided on one of the front access doors. After initial settings of temperature and humidity are made, the unit shall operate from this switch only.

The controls and indicator lights shall operate on 24 volt AC electric power from a transformer mounted in the unit electric box. All control wiring shall be identified by color or number corresponding to a detailed wiring schematic furnished with the unit. All power wiring shall be color coded, in accordance with applicable codes, with respect to voltage and phase.

An electric control box shall be located behind the front access door and shall be constructed in accordance with UL requirements. The cover shall be hinged and equipped with an easy operating quarter turn fastener. The box shall contain the main power terminal board, contactors, motor starter, 3-pole fuse block assemblies for each component branch circuit and control voltage transformer and fuse.

Piping - All chilled water piping shall be done with type L seamless copper tubing and insulated to prevent sweating. Gate valves on the supply and return lines shall be insulated within the unit. An automatic flow control valve shall be installed within the unit to maintain proper flow rate and system balancing. The flow control valve shall contain

quick-coupling fittings for measurement of flow. In addition, all valves, air vents, strainers, thermometers, hose connections, piping, and fittings shall be in accordance with the GSA-PBS standard detail for water coil connections as referenced in the GSA Standard Air Conditioning Specification dated December 1964 and amended in the latest edition of the GSA Guide Specification for Refrigeration Systems and Air Conditioning, PBS: 4-1590 dated August 1970.

Instruction Manual - The manufacturer shall provide 5 copies of a manual containing instructions for start-up, trouble shooting, maintenance, and service procedures. The manual shall contain a complete parts list, a chilled water piping diagram, an electric schematic drawing, and catalog cuts on all unit components including control elements.

Factory Start-Up - The manufacturer shall perform start-up tests on the units after installation has been completed. The temperature and humidity controls shall be checked and adjusted. The manufacturer shall provide verbal instruction to Agency personnel on the operation and maintenance of the air conditioning units.

Cooling Coil - The cooling coil shall be for use with chilled water. The coil shall be 6-rows deep, 1/2 inch copper tubes, minimum of 12 aluminum fins per inch, and have a minimum face area of 18.5 square feet. The coil

capacity shall be that specified herein with 46°F entering water temperature at 57 gpm. A condensate pan shall be installed under the coil with drain lines having a built in trap. Air vents and coil drain connections shall be provided.

Humidification - Humidification shall be provided by means of a humidifier of the electric pan type. Humidifier shall be installed on the upstream side of the evaporator coil which shall act as a baffle preventing carry over of unabsorbed moisture. A manual reset overheat safety device shall be installed on the submerged electrical heating element in the pan to break the circuit in case of overheat.

Filters - A rack for the air filters shall be provided in the top of the unit and shall allow for filter removal from the top. The first filter in the air stream shall be 1-inch thick standard fiberglass filter to act as a prefilter. The second filter in the air stream shall be 4-inches thick of the pleated treated fabric type. The total filter efficiency shall be 45% NBS rating on atmospheric dust. A minimum quantity of four (4) nominal 24 X 24 inch filters of each thickness shall be furnished with the unit.

Reheats - The required reheat during dehumidification shall be furnished by means of enclosed, finned type, electric heating elements. The elements shall be fabricated of a material to withstand moist conditions and shall be

installed on the air discharge side of the cooling coil. The elements shall be of a low watt density design and shall be capable of withstanding plus 10% of the normal operating voltage. Each stage of heat shall operate from 3-phase power.

Evaporator Blower - The unit shall contain two double width double inlet blowers of the centrifugal type with forward curved blades. The wheels shall be fabricated of hot-dipped galvanized steel and shall be equipped with sealed, permanently lubricated ball bearings, and heavy-duty machined cast sheave for multiple V-belt drive. The blower housings shall be fabricated of galvanized steel and shall be coated with 3-M #EC-100, or equal, for corrosion resistance and sound deadening. The blowers shall be located in the bottom of the unit, down stream of the cooling coil, to provide a draw-through effect to prevent pressurization of the cabinet which would result in air leakage through panels and doors. The blowers shall be capable of delivering the air volume specified herein.

Blower Motor - The blower motor shall be a minimum of 5 HP and shall be a standard NEMA frame size, drip proof construction, 1750 RPM and be equipped with sealed, permanently lubricated ball bearings. The motor sheave shall be of the variable pitch multiple type allowing blower speed variations of plus or minus 10% of the nominal speed.

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Cabinet Design - The frame shall be constructed of heavy welded steel angle, 3/16 inch thick, with special corner sockets (8 each) for elevated floor pedestal mounting. Exterior panels shall be constructed of 16 gauge sheet metal and painted to match the computer equipment or as otherwise specified.

All panels shall be insulated with a 1-inch thick, flame resistant, sound deadening, fiberglass insulation.

The unit shall contain three (3) front access doors, hinged and equipped with flush type snap latches and common keyed locks. Side and rear panels shall be easily removable for additional accessibility. All doors and panels shall be full height to allow maximum access.

The unit shall not exceed the following physical dimensions: 97-3/8-inches wide, 32-inches deep, 77-inches high.

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B. Chilled Water Piping.

1. The chilled water supply and return mains beneath the raised floor shall be located around the periphery of the Computer Room to avoid causing air barriers and cable interferences in the underfloor air distribution plenum. If an air handling unit is placed out in the center of the room, rather than against a wall, the chilled water pipes shall run straight from the air handling unit to the nearest wall.

2. Install two (2) automatic normally open packless butterfly chilled water valves in the branch supply and return pipes feeding chilled water to all Computer Room air handling units. If space permits the automatic valves shall be located within the Computer Room beneath the raised floor. If due to a lack of space the

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valves must be located in [redacted] they shall be positioned to permit easy access for inspection, service, and repair.

3. Install hand operated valves on each side of the automatic chilled water valves and a bypass around each automatic valve as shown on the chilled water piping drawing (Fig. B). If the automatic valves are located in the Computer Room all manual valves shall also be located in the Computer Room. If the automatic valves

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are located in [redacted] two manual isolation valves shall be located within the Computer Room.

C. Chilled Water Flow Measurement.

1. Provide a venturi type flow tube in the branch supply pipe feeding chilled water to all Computer Room air handling units. Locate the venturi within the Computer Room rather than in [redacted] Install the flow venturi in STATINTL accordance with approved practices as shown in venturi installation detail. (Fig. C)

2. Provide a flow meter for reading the venturi. The meter scale shall have a 6-inch diameter dial face, shall be for venturi measurement (not an orifice), shall read directly in GPM, and shall not require the use of multiplication factors or flow charts. The flow meter shall be permanently mounted on the Computer Room wall at eye level as close as possible to the venturi and piped to the venturi with 3/8 inch diameter copper tubing. All piping shall be sloped at least 1-inch per lineal foot to avoid liquid or air entrapment in the lines or meter body. Bypass, bleed, shut-off and block valves shall be installed as shown in meter piping detail (Fig. D) The two bleed ports of the meter shall be connected to the floor drain system with 1/2 inch diameter copper tubing.

D. Chilled Water Balance.

Balance the chilled water system after installation of all Computer Room air conditioning units to ensure that the actual GPM, head loss, etc. are actually within design limits.

E. Air Balance.

Balance new air distribution systems and submit complete data per guide specification.

F. Temperature and Humidity Measurement.

A two pen recording hygrometer-thermometer shall be installed in the Computer Room for monitoring temperature and humidity. The hygrometer-thermometer shall have a 24-hour electric drive and an 8-inch diameter paper chart which is easily changeable.

G. Floor Drains.

Four 3-inch diameter floor drains shall be installed through the concrete Computer Room floor slab. The drains shall be connected to a 3-inch diameter STATINTL copper pipe which runs to the sump-pit beneath the acid dilution tanks in [redacted]

H. Insulation.

All air supply ducts and chilled water supply and return pipes in the Computer Room shall be insulated with fire rated insulation.

I. Wall, Ceiling and Floor Penetrations.

1. Fire and smoke dampers shall be provided at all Computer Room wall penetrations of the ducts from the existing #2E and #3 air conditioning systems.

2. All penetration points in all walls and ceilings by chilled water lines,

air conditioning ducts, and electrical conduit shall be packed and grouted to maintain a 2-hour fire rating.

3. Where HVAC ducts to be removed penetrate the perimeter walls, blank off ducts with 16 gauge sheet metal caps on the outside face of the Computer Room wall and fill duct opening through the wall with concrete masonry unit to maintain a 2-hour fire rating.

4. Provide a sound attenuation section of duct where the main ducts from the existing #2E and #3 air conditioning systems penetrate the Computer Room.

5. Any openings into the Computer Room, regardless of size, shall be protected by 5/8 inch steel rods spaced 5 inches on center and securely imbedded into the Computer Room wall to a minimum depth of 3 inches or continuously welded to the adjacent plates. If it is necessary to have any openings in excess of 90 square inches, the 5/8 inch steel rods shall be 5 inches on center, both vertically and horizontally and similarly anchored. If grilles are already in place in existing ducts it must be assured that they conform to the above mentioned specifications.

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ARCHITECTURAL REQUIREMENTS

A. Optional Designs.

Designs and cost estimates shall be prepared for the following two ceiling and floor layouts:

1. New raised floor and ceiling except in the corner partitioned area housing the plotter machine. Steps shall be provided for walking down into the plotter room.

2. New raised floor and ceiling throughout, including the plotter room. The plotter table shall be raised and placed on concrete support pedestals as shown on detail drawing. (Fig. E)

NOTE - The following two air conditioning options for temperature and humidity control of the plotter area shall be included in each of the above two layouts:

a. Using only the existing #2E air handling unit.

b. Using only Computer Room air handling units.

B. Floor.

Install a twelve inch high Liskey Mark-20 elevated floor system in the Computer Room with ramp and steps down to the existing floor levels at locations shown on the drawings.

1. Provide 50 extra floor panels to be turned over to the Agency.

2. Provide and install fifty (50) 10 inch X 20 inch floor grille panels which are flush with the floor surface and contain adjustable volume dampers capable of operation from above the floor without grille removal.

3. The floor panels shall be supported by rigid-grid weight supporting stringers that can be walked on.

4. Ramps shall be constructed such that they possess a weight supporting capability equivalent to the raised floor system.

5. Electrically ground all raised floors.

C. Ceiling.

Install a new suspended acoustical tile ceiling in a 2 X 4 foot lay in grid system. Tile shall conform to Federal Specification SS-S-118a, Type IV, pattern C, Class 25, NRC 70, LR Grade 2.

D. Acid Waste Pipe.

A semi-circular trough shall be constructed beneath the entire length of the glass acid waste pipe which runs through the Computer Room. The trough shall be fabricated from an acid resistant material and shall be connected to the floor drain system which empties into the sump-pit beneath the acid dilution tanks in [redacted] STATINTL The trough shall be pitched to form a gravity drain. The glass acid pipe shall be wrapped with 2-hour fire rated insulation material that can be easily removed if it ever becomes necessary to make repairs to the pipe.

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E. Doors.

1. An additional fire exit shall be installed in the west wall of the Computer Room near the toilet. (Note: The required vault door will be provided by the Agency.) Interior mounted dead bolts or sliding bolts without combination or keyed locking devices shall be provided on the doors for easy emergency egress into the corridor.

2. Remove the existing double glass doors at the entrance to the Computer Room and install 2-hour fire rated doors. The new doors shall bear labels of Underwriter's Laboratory (UL) approval for a minimum 1-1/2-hour fire rating.

F. Walls.

Repair all holes in the masonry walls that existed before construction and were created during construction, both above and below the suspended ceiling. Prior to construction there were approximately 24 holes in the Computer Room walls.

G. Painting.

All exposed plaster, gypsum wallboard and masonry surfaces shall have paint coats applied in accordance with the painting guide specification. Final finish color shall be as later selected, generally in accordance with the system in use in the building.

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ELECTRICAL REQUIREMENTS

A. Fire Protection Systems.

1. Fire Extinguishing System - Designs and cost estimates shall be prepared for installation of each of the following two systems:

a. Halogen ("Halon") System similar to the system currently being installed in computer centers at the home office of the UNIVAC Corporation. Note: Halon is the safest (least toxic) gaseous extinguishing agent available and is especially suited for protecting electronic computer equipment because it leaves no residue and therefore eleminates costly after-fire clean-ups. Halon is approved and meets the standards of the National Fire Protection Association (NFPA) Standard No. 12A).

b. Wet Sprinkler System similar to the existing [redacted] system and STATINTL incorporating the following features:

- The entire Computer Room shall comprise a single zone.
- Recessed type sprinkler heads shall be installed and protected with metal guards to prevent operation from an accidental impact. If metal guards cannot be supplied by the sprinkler manufacturer as a standard option with the recessed type sprinkler heads, then guards shall be specially fabricated by the contractor.
- To permit easy testing and flushing of the sprinkler system, the end of each sprinkler branch line shall be connected to a header which runs

into the floor drain system. A gate valve shall be provided at the end of each branch line.

- Local annunciator and control panels which sound an alarm audible throughout the Computer Room.
- A flow switch and an open stem and rising yoke (OS&Y) valve shall be located outside the Computer Room. The OS&Y valve shall be equipped with a tamper switch and shall be suitable only for manual (not automatic) operation.
- The water flow detector shall have auxiliary contacts for automatic shutdown of all computer and air handling equipment. The automatic shutdown circuit shall function in parallel with the two manual emergency egress cut-off switches located adjacent to the Computer Room entrances such that either automatic or manual power shut-off can occur. Note: The emergency shut-off switch shall not interrupt power for either the florescent ceiling lights or the fire alarm annunciator panels and related equipment.
- The water flow detector and the OS&Y valve tamper switch shall have auxiliary contacts and shall be connected to the local annunciator panel and the [redacted] main alarm console by the contractor. Note: All connections to the [redacted] main alarm console shall be made from

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the local annunciator and control panels. The water flow detector and the OS&Y valve tamper switch shall not be directly connected to the main building alarm console.

- Sprinkler spacing shall be in accordance with UL approved heads.
- The sprinkler installation shall conform to applicable provisions of the National Fire Codes.
- All sprinkler deflectors shall have a temperature rating of 212° F.

2. Smoke Detector System - An ionization type smoke detection system shall be installed in accordance with the following requirements:

a. Smoke detectors under the raised floor (1 per 300 sq. feet or as required by code).

b. Smoke detectors above the drop ceiling (1 per 1,000 sq. feet or as required by code).

c. One smoke detector shall be located in each of the supply and return air ducts connected to the existing #2E and #3 air conditioning systems.

d. One smoke detector shall be located at the air discharge outlet on the filtered side of each of the Computer Room air handling units.

e. Local annunciator and control panels shall be provided which sound an alarm audible throughout the Computer Room.

f. Each smoke detector located below the raised floor, in the air supply and return ducts, and under the Computer Room air handling units shall have a corresponding indicator light located on the local annunciator panel.

g. Each smoke detector located above the drop ceiling shall have a corresponding indicator light located below the ceiling.

h. Activation of any smoke detector located above the drop ceiling shall activate a single zone light at the local annunciator panel.

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i. The activation of any one of the Computer Room smoke detectors, regardless of location, shall activate a single light and alarm [redacted] main control console. Note: All connections to the [redacted] main alarm STATINTL console shall be made from the local annunciator and control panels. The smoke detectors shall not be directly connected to the main building alarm console.

j. Activation of any smoke detector shall automatically shut off all Computer Room air handling equipment and close motorized dampers in the supply and return ducts which penetrate the Computer Room walls and connect to the #2E and/or #3 house air conditioning systems. Note: Activation of the smoke detection system shall not automatically shut off any of the computer equipment.

k. It shall be possible to acknowledge a smoke detection alarm from the local Computer Room annunciator panel and to restart the air handling equipment without the need for resetting remote controls at the main building alarm console.

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3. Annunciator and Control Panels -

a. All panels shall contain the necessary switches, alarm bells, supervisory meters, relays, pilot lamps (protruding lenses), and accessory equipment required for operation of the fire protection systems.

b. The panels shall be of the surface mounted type and shall have the necessary auxiliary contacts for connecting to the existing building alarm network at the main alarm console.

c. All panels shall be located adjacent to one another on a wall near the main egress and shall meet all requirements of NEMA Standard SB1-1962.

d. The annunciators shall be clearly labeled to identify any activated device. A scale layout map of the Computer Room, which identifies the exact location of each smoke detector shall be located adjacent to the annunciator panel.

4. Audible Alarm - An audible alarm system shall be installed which can be clearly heard throughout the Computer Room. Activation of either the sprinkler or smoke detection system shall trigger the audible alarm.

5. Emergency Egress Cut-Off Switches - Two manual emergency power cut-off switches shall be located in the Computer Room and connected to the main shunt trip breakers on the branch circuit panel boards. One emergency cut-off switch shall be located adjacent to the main Computer Room entrance and the other switch shall be located adjacent to the new emergency egress door in the west wall of the Computer

Room. Throwing either of the emergency cut-off switches shall shut off power to all computer equipment and all Computer Room air handling units. The florescent ceiling lights and fire alarm systems shall not be connected to these emergency cut-off switches.

6. Emergency Exit Lights - Battery powered lights shall be installed on brackets in each corner of the Computer Room. Outlet receptacles (120 volt) shall be provided for each emergency light at a height of 7 feet - 0 inches above the raised floor.

7. U. L. Approval and Compatibility with House Alarm Systems - All fire alarm equipment, including panels, sensors and all other system components shall bear labels of Underwriter's Laboratory (U. L.) approval and be compatible with the existing building alarm systems. All fire alarm equipment shall be installed in accordance with the applicable requirements of the National Fire Protection Association (NFPA) regulations and the GSA "Fire Alarm System" guide specifications 302-8 and 302-11.

B. Air Conditioning Equipment

Provide all feeders, protective equipment, control wiring, disconnect switches, etc., required for each Computer Room air handling unit. All wiring shall conform to applicable provisions of the National Electric Code.

C. Computer Equipment.

1. Provide all cables, connectors, protection devices, circuit breakers, etc. as required for the installation and operation of each piece of computer equipment.

2. All power and communication signal cables which run from either local

STATINTL or remote (i.e., [redacted] Room) distribution panels to underfloor convenience receptacles or junction boxes shall be placed in either rigid conduit, electrical metallic tubing, flexible metal conduit, type MI mineral insulated metal sheathed cable, or type ALS aluminum sheathed cable. All power and signal wiring in the underfloor area shall conform with this requirement (except for direct connections made between computer equipment by the computer manufacturer).

3. Separate receptacles and/or junction boxes shall be provided for each piece of computer equipment in accordance with requirements of the National Electric Code, Appendix 2, Article 75.

4. A minimum floor space clearance of 44 inches shall be maintained between computer equipment wherever such floor space is designated as a passageway between the equipment. (NFPA Standard)

D. Convenience Outlets.

Duplex convenience outlets shall be located in the Computer Room as follows:

1. Spaced 8 feet apart on walls at a height of 1 foot - 6 inches above the raised floor.

2. On columns 1 foot - 6 inches above the raised floor.

3. On the floor slab where required (special metal fittings, conduits, etc. shall be provided).

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E. Ceiling Lights.

Provide new florescent fixtures of the types, sizes and quantity as required to meet the I. E. S. Handbook (latest edition) recommended levels of illumination for the Computer Room.

1. The fixtures shall be designed for recessing in the drop ceiling.

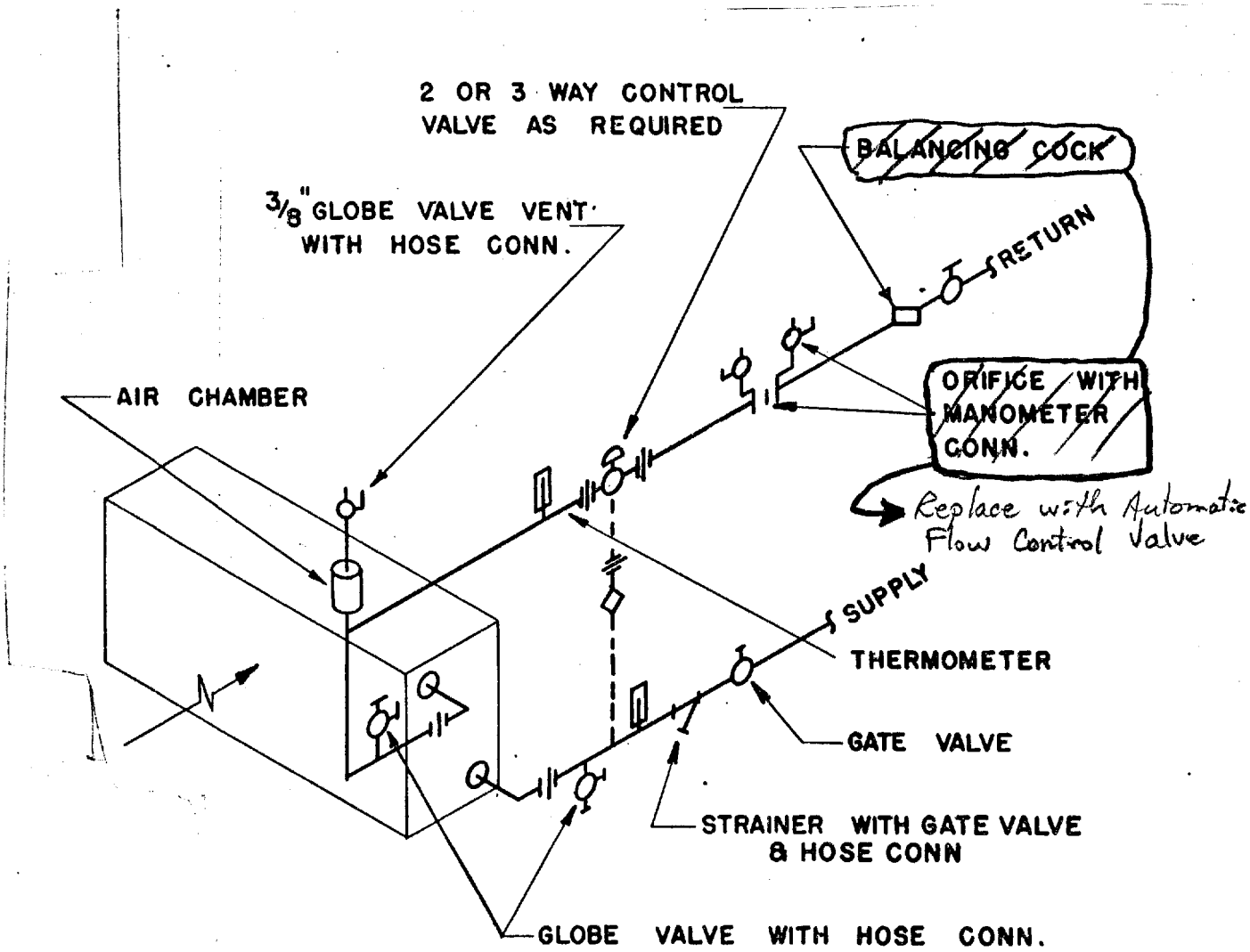
2. The fixtures' diffuser lens shall be a flat low-brightness type panel constructed of clear prismatic acrylic plastic or clear crystal glass.

3. The fixtures' ballasts shall be designed for operating on 277 volts.

4. The fixtures shall be installed in a manner to avoid interference with the sprinkler heads, diffusers, etc.

5. All fixtures shall be Underwirters' Laboratories, Inc. approved and so labeled.

6. All fixtures shall comply with GSA lighting guide specification 305-1A, "Lighting Fixtures" amendment No. 2, dated September 1968.



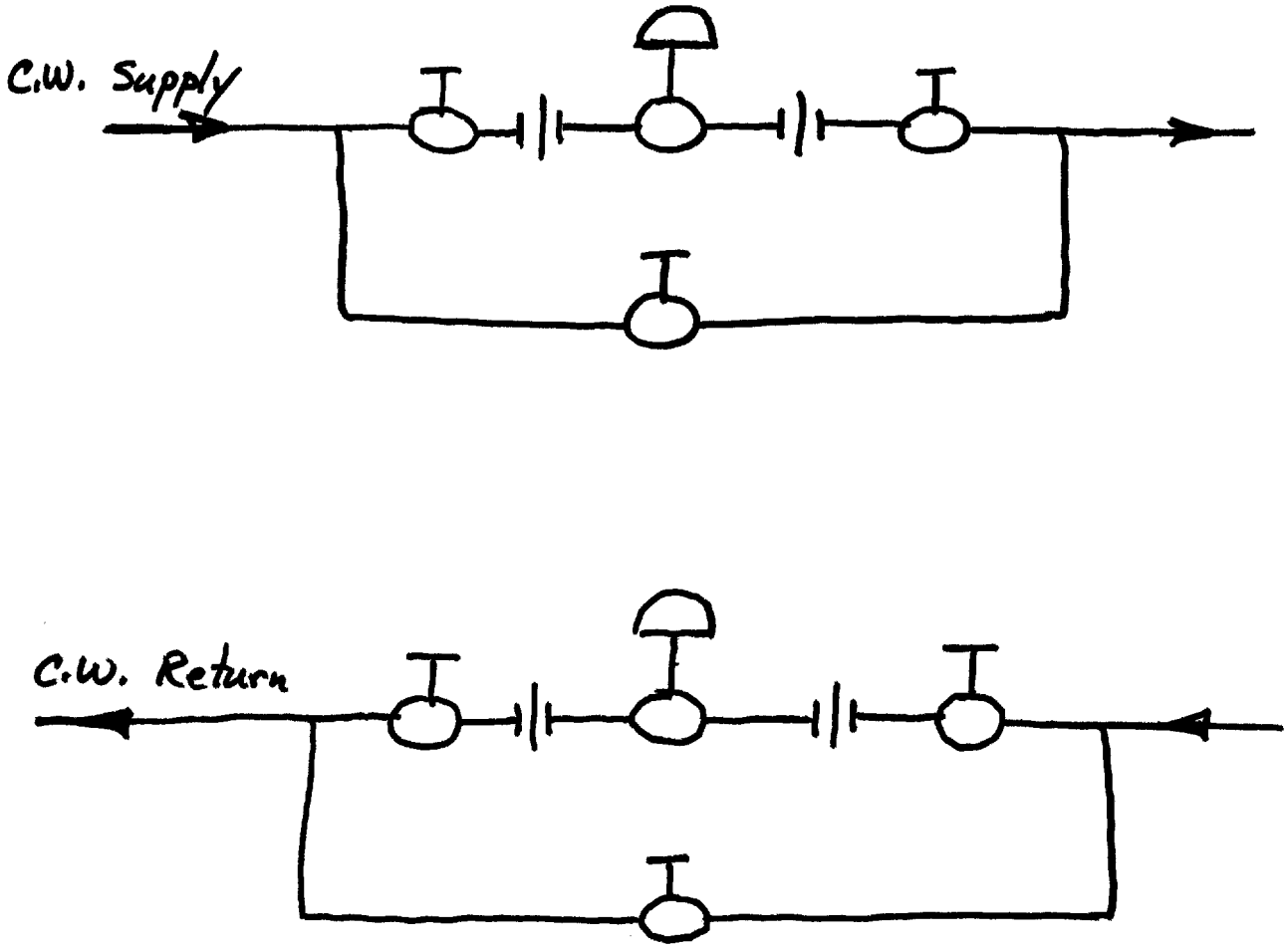

SINGLE COIL ARRANGEMENT

Reference: GSA Standard Detail No. 10-3-18A

GSA STANDARD DETAIL FOR WATER COIL CONNECTIONS



Fig. A




SCHEMATIC PIPING DIAGRAM FOR INSTALLATION OF AUTOMATIC CHILLED WATER ISOLATION VALVES

Fig. B

1. INSTALL SO THAT THE FLOW ARROW ON THE "FLOW VENTURI" IS IN THE SAME DIRECTION AS THE FLOW.

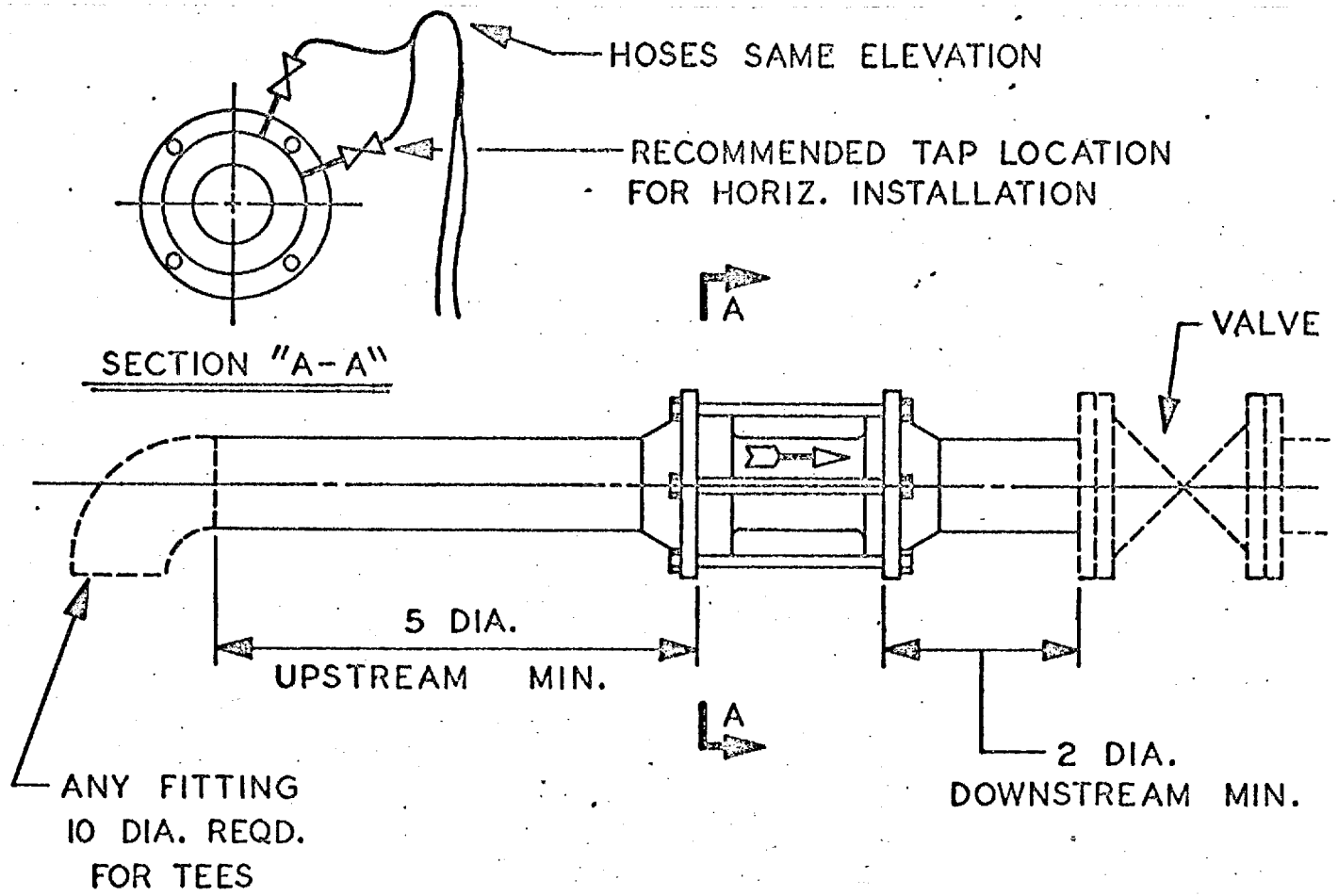


2. THE "FLOW VENTURI" MAY BE INSTALLED IN ANY POSITION.

   A. WHEN INSTALLED IN THE HORIZONTAL POSITION, THE METER CONNECTIONS SHOULD BE LOCATED ON OR NEAR THE SIDE.

   B. WHEN INSTALLED IN THE VERTICAL POSITION, THE METER CONNECTIONS CAN BE IN ANY POSITION.

3. INSTALL THE RED QUICK DISCONNECT ASSEMBLY ON THE UPSTREAM TAP AND GREEN QUICK DISCONNECT ASSEMBLY ON THE DOWNSTREAM TAP.

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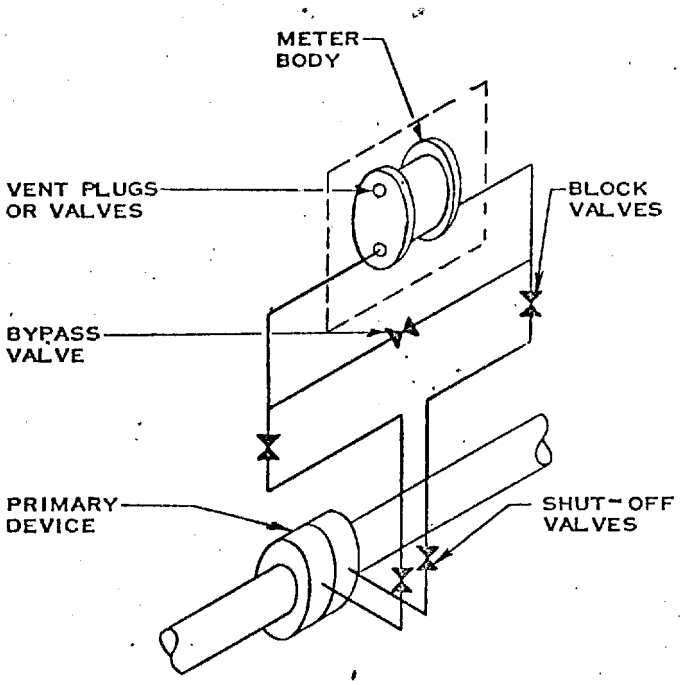
TYPICAL PIPING DETAIL FOR VENTURI FLOW TUBE INSTALLATION



Fig. C




LIQUID FLOW
METER ABOVE RUN

STATINTL

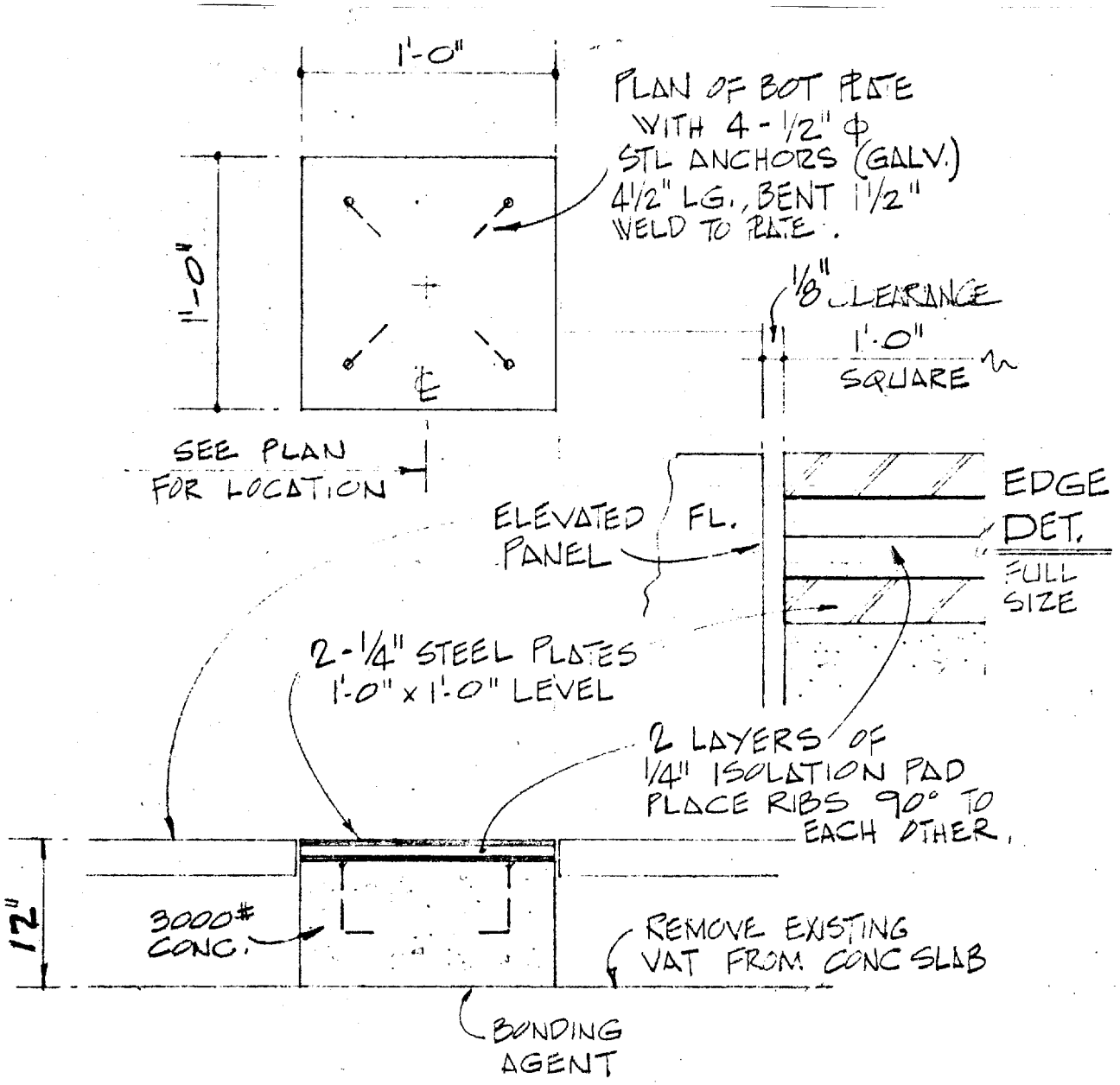
START-UP

1. CLOSE BOTH BLOCK VALVES; OPEN SHUT OFF VALVES.
2. CRACK VENT VALVES OR LOOSEN PLUGS FROM TOP PORTS OF METER BODY HOUSINGS AND OPEN BYPASS VALVE.
3. CRACK AND CLOSE BLOCK VALVES ALTERNATELY UNTIL LIQUID, FREE OF BUBBLES, SPILLS OUT OF BOTH UPPER METER BODY PORTS.
4. CLOSE VENT VALVES OR REPLACE PLUGS AND CLOSE BLOCK VALVE.
5. POINTER SHOULD INDICATE ZERO. IF NOT, AND NO LEAKS ARE DETECTED, THE HOUSINGS AND/OR PIPING ARE NOT COMPLETELY FULL OF LIQUID. REPEAT STEPS 1 THROUGH 5 UNTIL POINTER REMAINS STATIONARY AT ZERO.
6. OPEN BOTH BLOCK VALVES; CLOSE BYPASS VALVE.

[redacted]

TYPICAL PIPING DIAGRAM FOR FLOW METER INSTALLATION

Fig. D




SECTION AT EQUIP. SUPPORTS

4 REQUIRED

1 1/2" = 1'-0" & FULL SIZE DET.

TYPICAL DETAIL OF CONCRETE SUPPORTS FOR PLOTTER TABLE



Fig. E